

Shell Structures For Architecture Form Finding And Optimization

This volume collects together core papers by Richard K. Larson developing what has since come to be known as the "VP Shell" or "Split VP" analysis of sentential structure. The volume includes five previously published papers together with two major unpublished works from the same period: "Light Predicate Raising" (1989), which explores the interesting consequences of a leftward raising analysis of "NP Shift" phenomena, and "The Projection of DP (and DegP)" (1991), which extends the shell approach to the projection of nominal and adjectival structure, showing how projection can be handled in a uniform way. In addition to published, unpublished and limited distribution work, the volume includes extensive new introductory material. The general introduction traces the conceptual roots of VP Shells and its problems in the face of subsequent developments in theory, and offers an updated form compatible with modern Minimalist syntactic analysis. The section introductions to the material on datives, complex predicates and nominals show how the updated form of shell theory applies in the empirical domains where it was originally developed.

Shell Structures. Theory and Applications, Volume 2 contains 77 contributions from over 17 countries, reflecting a wide spectrum of scientific and engineering problems of shell structures. The papers are divided into six broad groups: 1. General lectures; 2. Theoretical modeling; 3. Stability; 4. Dynamics; 5. Numerical analysis; 6. Engineering design, and will be of interest to academics, researchers, designers and engineers dealing with theoretical modelling, computerized analyses and engineering design of thin-walled structures and shell structural elements.

Shell Structures for Architecture Form Finding and Optimization Routledge

Shells are basic structural elements of modern technology and everyday life. Examples are automobile bodies, water and oil tanks, pipelines, aircraft fuselages, nanotubes, graphene sheets or beer cans. Also nature is full of living shells such as leaves of trees, blooming flowers, seashells, cell membranes, the double helix of DNA or wings of insects. In the human body arteries, the shell of the eye, the diaphragm, the skin or the pericardium are all shells as well. Shell Structures: Theory and Applications, Volume 3 contains 137 contributions presented at the 10th Conference "Shell Structures: Theory and Applications" held October 16-18, 2013 in Gdansk, Poland. The papers cover a wide spectrum of scientific and engineering problems which are divided into seven broad groups: general lectures, theoretical modelling, stability, dynamics, bioshells, numerical analyses, and engineering design. The volume will be of interest to researchers and designers dealing with modelling and analyses of shell structures and thin-walled structural elements.

'Structure and Architecture' is an essential textbook for students and practitioners of architecture and structural engineering. MacDonald explains the basic principles of structure and describes the ranges of structure types in current use. Furthermore, the book links these topics directly with the activity of architectural design and criticism. An update of the first edition, 'Structure and Architecture 2ed' includes a revised opening chapter, and a new section that discusses prominent buildings constructed since the last edition was published in 1994. Angus MacDonald deals with structures holistically, relating detailed topics back to the whole structure and building. He aims to answer the questions: What are architectural structures? How does one define the difference between the structure of a building and all of the other components and elements of which it consists? What are the requirements of structures? What is involved in their design? An understanding of the concepts involved in answering these questions and an appreciation of how the structure of a building functions enhances the ability of an individual to appreciate its architectural quality. This book is unique in that it discusses the structural component of architectural design in the context of visual and stylistic issues.

Best known for his free-form shell structures, Heinz Isler has inspired both architects and engineers with his creations. His work transcends the definition of mere structural engineering to the extent of becoming structural art. This book considers the unique work of this engineer. Isler's primary medium of expression is the reinforced concrete shell. Rejecting the use of mathematical formulae, he approaches the challenges of each new structure by using physical modelling to determine the form and subsequently to investigate its stability. Harmonious, natural and inspiring structures are the result. Isler's sensitivity for the natural world is expressed in the quiet beauty of the shell forms that he has designed, which merge more easily into the landscape than most modern buildings. He creates structures of high efficiency with the lowest possible environmental impact. The author takes a look at Isler's major works, at the philosophy behind these works and at Isler's methods.

Structure as Architecture presents a comprehensive analysis of the indispensable role of structure in architecture. An exploration, as well as a celebration, of structure, the book draws on a series of design studies and case study examples to illustrate how structure can be employed to realize a wide range of concepts in contemporary architecture. By examining design principles that relate to both architecture and structural engineering, Andrew Charleson provides new insights into the relationship between both the technical and aesthetic aspects of architecture. Now in its second edition, the text has been extensively revised and updated throughout. Features include: A brand new chapter on hidden structure, adding to the material on exposed structures Two new chapters on using structure to realise common architectural concepts through a combination of precedents and creative design Over 50 new case studies from across the globe Easy-to-understand diagrams and a highly visual design to aid understanding and accessibility More than two hundred case studies of contemporary buildings from countries such as the UK, the US, France, Germany, Spain, Hong Kong, Australia and Japan illustrate how a thorough integration of structure adds layers of richness and enhances the realisation of architectural design concepts.

Throughout history, people have constructed simple timber lattice shelters such as the tepee or yurt, covered with animal skins, leaves, grasses and woven fabrics. Over the last fifty years, more sophisticated 'webs of wood' have emerged, with timber gridshells in particular becoming a structurally expressive form of architecture. Recent developments in digital design, 3-D modelling software, timber fabrication technologies as well as trends towards low-carbon construction have further reinforced architects' interest in the use of lightweight timber grids and lattice structures. This timely book charts the origin and evolution of the timber gridshell and its relation to timber lattice architecture. Drawing on a range of international case studies, the authors trace the effect advances in technology have had on design and construction in this field, providing a clear understanding of the structure, morphology, design process, and construction technology, and examining both the application and constraints of timber gridshells in architectural design. Timber Gridshells is a highly illustrated, up-to-date resource which provides detailed answers and inspires new ideas. As such, it is essential reading for students of architecture as well as professional architects.

Shells are basic structural elements of modern technology. Examples of shell structures include automobile bodies, domes, water and oil tanks, pipelines, ship hulls, aircraft fuselages, turbine blades, loudspeaker cones, but also balloons, parachutes, biological membranes, a human skin, a bottle of wine or a beer can. This volume contains full texts of over 100 papers presented by specialists from over 20 countries at the 8th Conference "Shell Structures: Theory and Applications", 12-14 October, 2005 in Jurata (Poland). The aim of the meeting was to bring together scientists, designers, engineers and other specialists in shell structures in order to discuss important results and new ideas in this field. The goal is to pursue more accurate theoretical models, to develop more powerful and versatile methods of analysis, and to disseminate expertise in design and maintenance of shell structures. Among the authors there are many distinguished specialists of shell structures, including the authors of general lectures: I.V. Andrianov (Ukraine), V.A. Eremeyev (Russia), A. Ibrahimbegovic (France), P. Klosowski (Poland), B.H. Kröplin

(Germany), E. Ramm (Germany), J.M. Rotter (UK) and D. Steigmann (USA). The subject area of the papers covers various theoretical models and numerical analyses of strength, dynamics, stability, optimization etc. of different types of shell structures, their design and maintenance, as well as modelling of some surface-related mechanical phenomena.

In structural terms reciprocal frame structures are 'three dimensional assemblies of mutually supporting beams'. But behind this definition lie some breathtakingly beautiful and complex structures at the heart of buildings both ancient and modern. This new book explores the principles of these apparently simple structures and demonstrates how they can be used in the context of a modern building. Starting with historic designs by de Honnecourt, Da Vinci and Serlio, the book presents the wealth of possible RF morphologies, and investigates the geometrical, structural and practical design issues of reciprocal frames. The case studies look at stunning examples of reciprocal frame architecture that range from low environmental impact buildings and self built examples in the UK and USA, to the fascinating and elegant structures of the Puppet Theatre in Seiwa, Tokyo's Spinning House, Sukiya –Yu house, The Toyoson Stonemason museum and the Life Sciences Laboratory – Torikabuto in Japan. The book is designed to inform and inspire architects and structural engineers alike, and brings to life a structural system whose principles have been used for thousands of years. * Simple introduction to the design principles of mutually supporting structures * Explores the impact of structural choices on the aesthetic impact of a building * Highly illustrated case studies from across the globe

Structure As Architecture provides readers with an accessible insight into the relationship between structure and architecture, focusing on the design principles that relate to both fields. Over one hundred case studies of contemporary buildings from countries across the globe including the UK, the US, France, Germany, Spain, Hong Kong and Australia are interspersed throughout the book. The author has visited and photographed each of these examples and analyzed them to show how structure plays a significant architectural role, as well as bearing loads. This is a highly illustrated sourcebook, providing a new insight into the role of structure, and discussing the point where the technical and the aesthetic meet to create the discipline of 'architecture'. This authoritative text concentrates on the derivation of simple but reasonably accurate mathematical solutions, and the actual presentation of closed-form results for quantities that are of interest to the designer of shell structures.

Building a masterpiece explores some of the untold chapters in the long history of the Opera House's gestation, development and completion -- of individuals whose careers were made or broken by the Opera House, the companies whose reputations were secured through their association with the building, and the pioneering construction methods, innovative technologies and methodologies developed to meet the demands of its unprecedented design and challenging construction. The workers who built the building, the politicians, architects and members of the public who championed it and its often beleaguered architect are discussed as is its current world status as a symbol of Australia. To coincide with the 40th anniversary of the opening of the Sydney Opera House, this new edition of Building a Masterpiece will include a new chapter on another little known and much misunderstood story: the architect who took over from Utzon and completed the project.

Back in print--the standard work on Heino Engel's structure systems. The hundreds of drawings and photographs reproduced in this hardback volume offer almost endless variations on the many structural systems that can keep buildings together: within a few pages of one another, tents, domes and cubes are shown supported by poles, cables, ribs, rafters and beams. Engel's presentation and explanation of this highly complex material differs fundamentally from others' work on the subject in that he focuses entirely upon the functions and design effects of these mechanisms, without regard for technical details: More than an engineering text, this is a catalogue of ideas and forms for architects and dreamers, a David Macaulay book for adults. Structure Systems skips over more commonly treated special designs and completed buildings for typical, representative and surprising shapes. As a reference work or daydream material, it is an indispensable repertoire of forms.

Together with masonry construction, timber construction is usually one of the first building exercises encountered by the student in his or her training. This volume begins by presenting the building material timber in all of its facets and explaining the fundamental principles of timber construction. It then goes on to describe the most important building components and their constructive possibilities, specifically as they pertain to building with timber. Subjects: Timber as building material, Timber preservation, Systems for building with timber, Building components from foundation to roof.

Nature has always been a source of inspiration for the design of the human environment. The analysis of biological constructions can not only lead to astonishing technical solutions but can also inspire the design of architecture. Bionics is a fascinating border area between pure research and practical application: biologists, chemists, physicists, mineralogists, and paleontologists meet up with material scientists, engineers, and architects and transfer their knowledge to architecture and construction. Using numerous practical examples, this richly illustrated introduction traces the process from the understanding of how something functions, to abstraction—for example in computer models—and the construction of initial prototypes, through to fully functional manufacture and production.

This is a book about structures that shows students how to "see" structures as integral to architecture, and how knowledge of structures is the basis for understanding both the mechanical and conceptual aspects inherent to the art of building. Analyzing the structural principles behind many of the best known works of architecture from past and present alike, this book places the subject within a contemporary context. The subject matter is approached in a qualitative and discursive manner, and is illustrated by many photographs of architectural projects and structural behaviour diagrams. This new edition is revised and updated throughout, includes worked-out examples, and is perfect as either an introductory structures course text or as a designer's sourcebook for inspiration.

Shell structures are widely used in the fields of civil, mechanical, architectural, aeronautical, and marine engineering. Shell technology has been enhanced by the development of new materials and prefabrication schemes. Despite the mechanical advantages and aesthetic value offered by shell structures, many engineers and architects are relatively unacquainted with shell behaviour and design. This book familiarizes the engineering and architectural student, as well as the practicing engineer and architect, with the behaviour and design aspects of shell structures. Three aspects are presented: the Physical behaviour, the structural analysis, and the design of shells in a simple, integrated, and yet concise fashion. Thus, the book contains three major aspects of shell engineering: (1) physical understanding of shell behaviour; (2) use of applied shell theories; and (3) development of design methodologies together with shell design examples. The theoretical tools required for rational analysis of shells are kept at a modest level to give a sound grasp of the fundamentals of shell behaviour and, at the same time, an understanding of the related theory, allowing it to be applied to actual design problems. To achieve a physical understanding of complex shell behaviour, quantitative presentations are supplemented by qualitative discussions so that the reader can grasp the 'physical feeling' of shell behaviour. A number of analysis and detailed design examples are also worked out in various chapters, making the book a useful reference manual. This book can be used as a textbook and/or a reference book in undergraduate as well as graduate university courses in the fields of civil, mechanical, architectural, aeronautical, and materials engineering. It can also be used as a reference and design-analysis manual for

the practicing engineers and architects. The text is supplemented by a number of appendices containing tables of shell analysis and design charts and tables.

The first monograph to celebrate the architectural legacy of the Guastavino family is now available in paperback. First-generation Spanish immigrants Rafael Guastavino and his son Rafael Jr. oversaw the construction of thousands of spectacular tile vaults across the United States between the 1880s and the 1950s. These versatile, strong, and fireproof vaults were built by Guastavino in more than two hundred major buildings in Manhattan and in hundreds more across the country, including Grand Central Terminal, Carnegie Hall, the Biltmore Estate, the Cathedral of St. John the Divine, the Registry Room at Ellis Island, and many major university buildings. Guastavino Vaulting blends a scholarly history of the technology with archival images, drawings, and stunning photographs that illustrate the variety and endurance of this building method.

Structures and Architecture – Bridging the Gap and Crossing Borders contains the lectures and papers presented at the Fourth International Conference on Structures and Architecture (ICSA2019) that was held in Lisbon, Portugal, in July 2019. It also contains a multimedia device with the full texts of the lectures presented at the conference, including the 5 keynote lectures, and almost 150 selected contributions. The contributions on creative and scientific aspects in the conception and construction of structures, on advanced technologies and on complex architectural and structural applications represent a fine blend of scientific, technical and practical novelties in both fields. ICSA2019 covered all major aspects of structures and architecture, including: building envelopes/façades; comprehension of complex forms; computer and experimental methods; futuristic structures; concrete and masonry structures; educating architects and structural engineers; emerging technologies; glass structures; innovative architectural and structural design; lightweight and membrane structures; special structures; steel and composite structures; structural design challenges; tall buildings; the borderline between architecture and structural engineering; the history of the relationship between architects and structural engineers; the tectonic of architectural solutions; the use of new materials; timber structures, among others. This set of book and multimedia device is intended for a global readership of researchers and practitioners, including architects, structural and construction engineers, builders and building consultants, constructors, material suppliers and product manufacturers, and other professionals involved in the design and realization of architectural, structural and infrastructural projects.

Tensile surface structures are the visual expression of an intensive rethinking of the topic of building envelopes by designers. Advances in design methods, materials, construction elements and assembly and erection planning in the field of lightweight construction are enabling ever more exacting applications of tensile structures with envelope and structural functions, especially in roofing over large clear spans without internal support. However, the particular mechanical characteristics of the materials used in the construction of textile structures demand consideration of the question of "buildability". This book provides answers by discussing the fundamental influence of material manufacture and assembly in deciding the most suitable type of building or structure and its detailing in the design process. The fundamentals of material composition, manufacturing process, patterning and the behaviour of flexible structural systems are all explained here, as well as their use as structural and connection elements, and special attention is given to the erection of wide-span lightweight structures. The erection equipment is described, as well as the lifting and tensioning process and the construction methods used to erect the characteristic types of tensile structures, illustrated with a selection of example projects. Foreword by Werner Sobek.

Now in its second edition: the trailblazing introduction and textbook on construction includes a new section on translucent materials and an article on the use of glass.

The field of "Environment-and-Behavior" This bibliography is aimed at the researcher and advanced student working in the field of environmental psychology, as it has come to be designated over the past decade. A more appropriate term might be "environment-behavior studies," to suggest the important characteristic of this field as one that transcends the province of the psychologist, and brings together workers, as well as problems, methods, and concepts from a great diversity of disciplines and professional fields. Among these we may include geography and sociology, architecture, landscape architecture and planning, forestry, natural resource management and leisure and recreation research -- to name only the most important of the diverse fields from which material for this bibliography has been drawn. This is in fact one of the primary reasons for our belief in the value of such a volume. The literature in the environment-behavior field is scattered through the most diverse sources, including not only the major periodical and monographic literature in each of the above-mentioned disciplines and professions (and others as well), but also a variety of more specialized publications of varying degrees of accessibility. Thus it seemed to us helpful to the researcher, teacher and student in this area to bring this far-flung literature together in a single volume, that might be used as a guide to the field. We aimed at a comprehensive treatment, including both basic and applied aspects, and relations of behavior both to the man-made or artificial and to the natural environment.

A superb visual reference to the principles of architecture Now including interactive CD-ROM! For more than thirty years, the beautifully illustrated Architecture: Form, Space, and Order has been the classic introduction to the basic vocabulary of architectural design. The updated Third Edition features expanded sections on circulation, light, views, and site context, along with new considerations of environmental factors, building codes, and contemporary examples of form, space, and order. This classic visual reference helps both students and practicing architects understand the basic vocabulary of architectural design by examining how form and space are ordered in the built environment. Using his trademark meticulous drawing, Professor Ching shows the relationship between fundamental elements of architecture through the ages and across cultural boundaries. By looking at these seminal ideas, Architecture: Form, Space, and Order encourages the reader to look critically at the built environment and promotes a more evocative understanding of architecture. In addition to updates to content and many of the illustrations, this new edition includes a companion CD-ROM that brings the book's architectural concepts to life through three-dimensional models and animations created by Professor Ching.

This volume reviews the work of Eladio Dieste. It discusses Dieste's own approach to his work, using many examples, and explores the interrelationship between the structural form and architecture of the buildings.

*** Featuring a foreword by Pritzker Prize Winner Shigeru Ban *** Bringing together experts from research and practice, Shell Structures for Architecture: Form Finding and Optimization presents contemporary design methods for shell and gridshell structures, covering form-finding and structural optimization techniques. It introduces architecture and engineering practitioners and students to structural shells and provides computational techniques to develop complex curved structural surfaces, in the form of mathematics, computer algorithms, and design case studies. • Part I introduces the topic of shells, tracing the ancient relationship between structural form and forces, the basics of shell behaviour, and the evolution of form-finding and structural optimization techniques. • Part II familiarizes the reader with form-finding techniques to explore expressive structural geometries, covering the force density method, thrust network analysis, dynamic relaxation and particle-spring systems. • Part III focuses on shell shape and topology optimization, and provides a deeper understanding of gradient-based methods and meta-heuristic techniques. • Part IV contains precedent studies of realised shells and gridshells describing their innovative design and construction methods.

Spanish-born Félix Candela (1910–1997) is acknowledged as a master builder who designed and built innovative thin shell concrete roof structures in Mexico. This book goes further, however, hailing Candela as a structural engineer whose elegant forms should be considered works of art. This handsomely designed volume begins by presenting the lineage of master builders and

structural artists who preceded him, including those from the period of the Industrial Revolution. The authors then examine Candela's life, studies, and experiences, and analyze his early thin shell designs. They focus on the geometric form that Candela eventually used to create his most important works, examine several of the structures in detail, compare them to the works of other contemporary structural artists, and discuss the most important features of his legacy: the conservation of natural resources by minimizing materials; the reduction of cost by intimately connecting design to construction, and the creation of beautiful forms. Here, in one volume, is all the architect needs to know to participate in the entire process of designing structures. Emphasizing bestselling author Edward Allen's graphical approach, the book enables you to quickly determine the desired form of a building or other structure and easily design it without the need for complex mathematics. This unique text teaches the whole process of structural design for architects, including selection of suitable materials, finding a suitable configuration, finding forces and size members, designing appropriate connections, and proposing a feasible method of erection. Chapters are centered on the design of a whole structure, from conception through construction planning.

Although the disciplines of architecture and structural engineering have both experienced their own historical development, their interaction has resulted in many fascinating and delightful structures. To take this interaction to a higher level, there is a need to stimulate the inventive and creative design of architectural structures and to persuade architects and structural engineers to further collaborate in this process, exploiting together new concepts, applications and challenges. This set of book of abstracts and full paper searchable CD-ROM presents selected papers presented at the 3rd International Conference on Structures and Architecture Conference (ICSA2016), organized by the School of Architecture of the University of Minho, Guimarães, Portugal (July 2016), to promote the synergy in the collaboration between the disciplines of architecture and structural engineering. The set addresses all major aspects of structures and architecture, including building envelopes, comprehension of complex forms, computer and experimental methods, concrete and masonry structures, educating architects and structural engineers, emerging technologies, glass structures, innovative architectural and structural design, lightweight and membrane structures, special structures, steel and composite structures, the borderline between architecture and structural engineering, the history of the relationship between architects and structural engineers, the tectonics of architectural solutions, the use of new materials, timber structures and more. The contributions on creative and scientific aspects of the conception and construction of structures, on advanced technologies and on complex architectural and structural applications represent a fine blend of scientific, technical and practical novelties in both fields. This set is intended for both researchers and practitioners, including architects, structural and construction engineers, builders and building consultants, constructors, material suppliers and product manufacturers, and other experts and professionals involved in the design and realization of architectural, structural and infrastructural projects.

Lightweight structures and material optimized systems are of major relevance in the building industry and particularly in the design of concrete structures. This is not only for aesthetic reasons, but also to use material in a resource conserving way. The increase of strength characteristics, as one measure to reduce cross section dimensions, postulates the prefabrication of cementitious materials under laboratory conditions. This thesis examines the contradiction of the possibility to realize slender concrete elements and the complexity of the discontinued homogeneity arising from necessary segmentations. Proposals of implementation strategies are demonstrated and verified on the basis of selected case studies.

The Kingdome, John ("Jack") Christiansen's best-known work, was the largest freestanding concrete dome in the world. Built amid public controversy, the multipurpose arena was designed to stand for a thousand years but was demolished in a great cloud of dust after less than a quarter century. Many know the fate of Seattle's iconic dome, but fewer are familiar with its innovative structural engineer, Jack Christensen (1927-2017), and his significant contribution to Pacific Northwest and modernist architecture. Christiansen designed more than a hundred projects in the region: public schools and gymnasiums, sculptural church spaces, many of the Seattle Center's 1962 World's Fair buildings, and the Museum of Flight's vast glass roof all reflect his expressive ideas. Inspired by Northwest topography and drawn to the region's mountains and profound natural landscapes, Christiansen employed hyperbolic paraboloid forms, barrel-vault structures, and efficient modular construction to echo and complement the forms he loved in nature. Notably, he became an enthusiastic proponent of using thin shell concrete--the Kingdome being the most prominent example--to create inexpensive, utilitarian space on a large scale. Tyler Sprague places Christiansen within a global cohort of thin shell engineer-designers, exploring the use of a remarkable structural medium known for its minimal use of material, architecturally expressive forms, and long-span capability. Examining Christiansen's creative design and engineering work, Sprague illuminates Christensen's legacy of graceful, distinctive concrete architectural forms, highlighting their lasting imprint on the region's built environment.

Geometry lies at the core of the architectural design process. It is omnipresent, from the initial determination of form to the final construction. Modern geometric computing provides a variety of tools for the efficient design, analysis, and manufacturing of complex shapes. On the one hand this opens up new horizons for architecture. On the other, the architectural context also poses new problems for geometry. The research area of architectural geometry, situated at the border of applied geometry and architecture, is emerging to address these problems. This volume, presenting the papers accepted at the 2010 Advances in Architectural Geometry conference in Vienna, reflects the substantial progress made in this field. The interdisciplinary nature of architectural geometry is reflected in the diversity of backgrounds of the contributing authors. Renowned architects, engineers, mathematicians, and computer scientists present novel research ideas and cutting-edge solutions at the interface of geometry processing and architectural design.

Shell structures is a term defining concrete or steel vaults of present century architecture that derive from the masonry vaults and domes of the past.

The East German engineer Ulrich Muther contributed an important chapter to the European history of shell construction. In 1963 he created the first concrete shell as the realisation of his diploma project in the former GDR. His career of the more than 30 years saw many milestones. Ulrich Muther realised his pioneering shell constructions in his homeland on the island of Rugen, in and around Rostock and in other parts of Mecklenburg-Western Pomerania. This book alternates between a classical architecture guide and an almost archaeological inventory. It furnishes a well founded insight into the euphoric belief in progress that attended the building boom of the sixties and seventies. All the relevant objects in Mecklenburg-West Pomerania have been assembled in one publication for the first time. The buildings are portrayed with the aid of current photographs, plans, texts and project information. Survey maps and addresses facilitate on-site visits.

Fabricate 2020 is the fourth title in the FABRICATE series on the theme of digital fabrication and published in conjunction with a triennial conference (London, April 2020). The book features cutting-edge built projects and work-in-progress from both academia and practice. It brings together pioneers in design and making from across the fields of architecture, construction, engineering, manufacturing, materials technology and computation. Fabricate 2020 includes 32 illustrated articles punctuated by four conversations between world-leading experts from design to engineering, discussing themes such as drawing-to-production, behavioural composites, robotic assembly, and digital craft.

Learning a new discipline is similar to learning a new language; in order to master the foundation of architecture, you must first master the basic building blocks of its language – the definitions, function, and usage. Language of Architecture provides students and professional architects with the basic elements of architectural design, divided into twenty-six easy-to-comprehend chapters. This visual reference includes an introductory, historical view of the elements, as well as an overview of how these elements can and have been used across multiple design disciplines. Whether you're new to the field or have been an architect for years, you'll want to flip through the pages of this book throughout your career and use it as the go-to reference for inspiration, ideas, and reminders of how a strong knowledge of the basics allows for meaningful, memorable, and beautiful fashions that extend beyond trends. This comprehensive learning tool is the one book you'll want as a staple in your library.

A classic examination of superb design through the centuries. Widely regarded as a classic in the field, Experiencing Architecture explores the history and promise of good design. Generously illustrated with historical examples of designing excellence—ranging from teacups, riding boots, and golf balls to the villas of Palladio and the fish-feeding pavilion of Beijing's Winter Palace—Rasmussen's accessible guide invites us to appreciate architecture not only as a profession, but as an art that shapes everyday experience. In the past, Rasmussen argues, architecture was not just an individual pursuit, but a community undertaking. Dwellings were built with a natural feeling for place, materials and use, resulting in “a remarkably suitable comeliness.” While we cannot return to a former age, Rasmussen notes, we can still design spaces that are beautiful and useful by seeking to understand architecture as an art form that must be experienced. An understanding of good design comes not only from one's professional experience of architecture as an abstract, individual pursuit, but also from one's shared, everyday experience of architecture in real time—its particular use of light, color, shape, scale, texture, rhythm and sound. Experiencing Architecture reminds us of what good architectural design has accomplished over time, what it can accomplish still, and why it is worth pursuing. Wide-ranging and approachable, it is for anyone who has ever wondered “what instrument the architect plays on.”

A new paradigm combining architectural tradition with emerging technologies Digital tools have launched architecture into a dizzying new era, one in which wood, stone, metal, glass, and other traditional materials are augmented by pixels and code. In this ambitious exploration, an eminent thinker examines what, exactly, the building blocks of architecture have meant over the centuries and how technology may—or may not—be changing how we think about them. Antoine Picon argues that materiality is not only about matter and that the silence and inscrutability—the otherness—of raw materials work against humanity's need to live in a meaningful world. He describes how people define who they are, in part, through their specific physical experience of architectural materials and spaces. Indeed, Picon asserts, the entire paradox of the architectural discipline consists in its desire to render matter expressive to human beings. Through a retrospective review of canonical moments in Western European architecture, Picon offers an original perspective on the ways materiality has varied throughout centuries, demonstrating how experiences of the physical world have changed in relation to the evolution of human subjectivity. Ultimately, Picon concludes that computer-based design methods are not an abrupt departure from previous architectural traditions but rather a new way for architects to control material resources. The result reinforces the fundamentally humanistic nature of architectural endeavor with an increasing sense of design freedom and a release from material constraint in the digital era.

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